

**Studies in the Malesian, Australian and Pacific
Ingeæ (*Leguminosæ-Mimosoideæ*) : the genera
Archidendropsis, *Wallaceodendron*,
Paraserianthes, *Pararchidendron*
and *Serianthes*
(part I)**

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Summary : The generic limits of the Malesian, Australian and Pacific *Ingeæ* (*Leguminosæ-Mimosoideæ*) are discussed. The diagnostic characters are evaluated. Three new genera, *Archidendropsis*, *Paraserianthes* and *Pararchidendron* are proposed. Keys to and enumerations of the species in the genera *Archidendropsis*, *Wallaceodendron*, *Paraserianthes*, *Pararchidendron* and *Serianthes* are presented.

Résumé : Discussion sur la délimitation des genres de Malaisie, d'Australie et du Pacifique appartenant à la tribu des *Ingeæ* (*Leguminosæ-Mimosoideæ*). Les caractères utilisés dans les diagnoses sont évalués. Trois nouveaux genres, *Archidendropsis*, *Paraserianthes* et *Pararchidendron* sont proposés. Des clés, ainsi que la liste des espèces dans les genres *Archidendropsis*, *Wallaceodendron*, *Paraserianthes*, *Pararchidendron* et *Serianthes* sont présentées.

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The present paper is a part of a total revision of all the Asian, Australian and Pacific *Ingeæ*. Earlier accounts on the genera *Archidendron* and *Albizia* from Mainland S.E. Asia have been published in *Adansonia*, ser. 2, 19 (1) : 3-37 (1979), 19 (2) : 199-229 (1979) with elaborate descriptions and illustrations in *Flore du Cambodge du Laos et du Viêt-Nam* 19 (1981) and in *Flora of Thailand* (in ed.). The New Caledonian species of *Archidendropsis* and *Serianthes* were treated in detail in " *Flore de la Nouvelle-Calédonie et Dépendances* " (NIELSEN, 1983). This paper covers the East Malesian, Australian and Pacific species of *Ingeæ* which are not referable to the two large genera *Archidendron* and *Albizia*. It is thus a precursor for " *Flora Malesiana* ". Tine BARETTA-KUIPERS is responsible for the wood-anatomical data, Philippe GUINET for the palynological data, Ivan NIELSEN for the

chapters on history, morphology, geography, the keys and the taxonomic section. The chapter with the discussion has been written in common.

In this first part of the paper descriptions of the new taxa are given and the new combinations are proposed in order to avoid *nomina nuda* in the key. Keys, descriptions, synonymy, typification, distribution and ecology of the species will be published in the two forthcoming fascicles of the present journal (Bulletin du Muséum de Paris, Section B, Adansonia). The New Caledonian taxa, which have been dealt with in detail in Flore de la Nouvelle-Calédonie, vol. 12 (1983), are only enumerated in the present treatment.

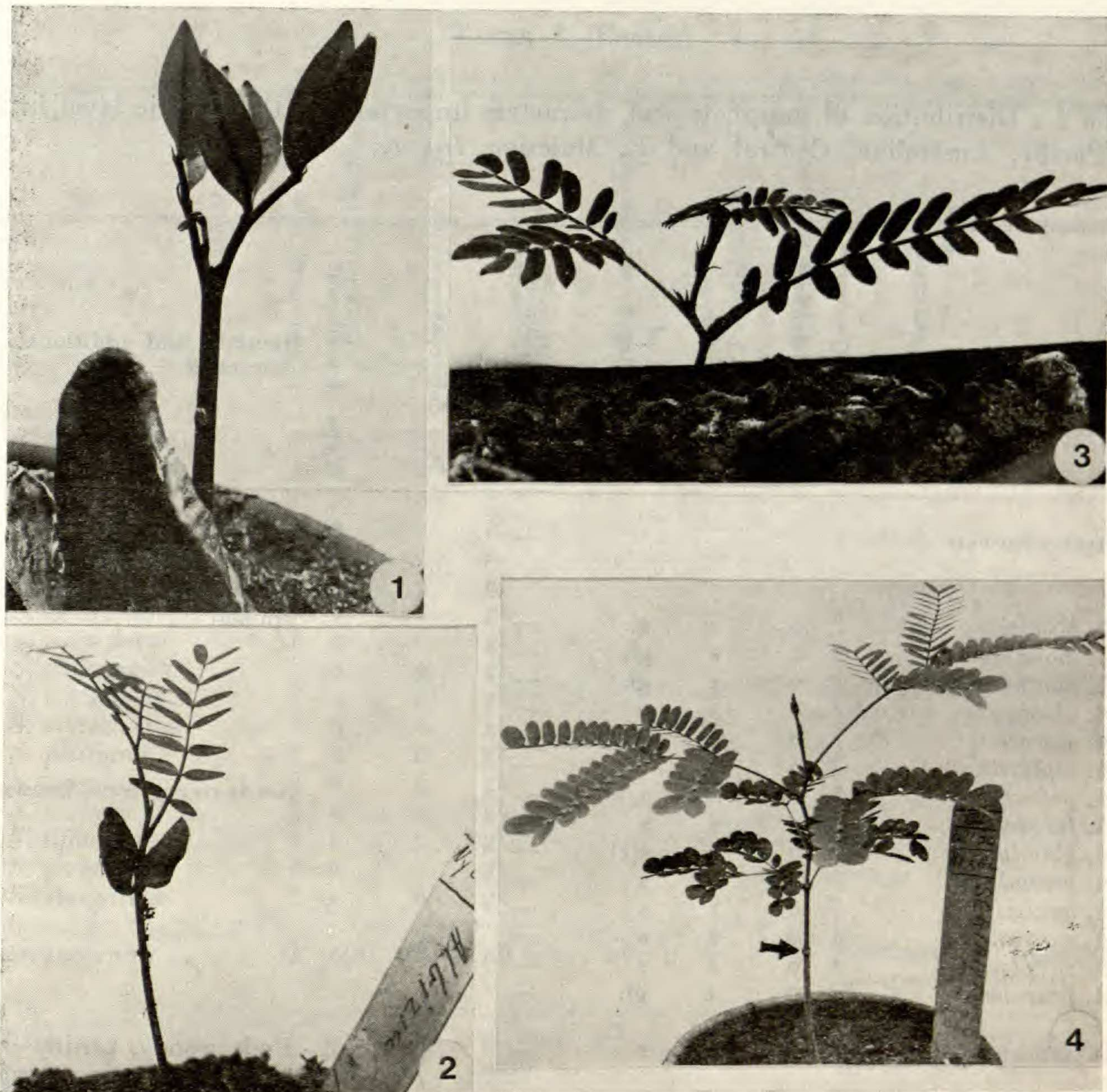
In connection with the Kew Conference on Legumes we discussed the need for a reassessment of the genera of *Ingeæ* on world basis. NIELSEN (1981a) is a summary of the history of the treatment of the group and presents tentatively a new classification. Considering the number of species and the amount of material to be investigated (*ca.* 17 genera with 950-1000 species) we felt it better to start with regional revisions of the group according to the frame-work presented in NIELSEN (1981 a). In this work 9 genera were recognized from this region. Three of those were enumerated by the letters A, B and C. In this paper they are treated as *Paraserianthes*, *Archidendropsis* and *Pararchidendron* respectively. They have a mainly E. Malesian, Australian and Pacific distribution and are related to the genera *Serianthes* and *Wallaceodendron* and more remotely to *Archidendron*. *Archidendron* which has *ca.* 100 species was revised by DE WIT (1942, 1952) and MOHLENBROCK (1963 a, b ; 1966) (as *Pithecellobium* sect. *Archidendron*) for the E. Malesian and the Australian area. KOSTERMANS (1954 a, b ; 1956 ; 1960 ; 1966) has dealt with the species of mainland Asia and the mainly W. Malesian area which was formerly included in the genus *Pithecellobium*. *Serianthes* was revised by FOSBERG (1960) and KANIS (1980) (Malesian species). The only groups, which have not been revised within the last 30 years are *Albizia* subg. *Albizia* in the Malesian-Australian area and most of the species of *Archidendropsis* which have their main occurrence in New Caledonia.

MORPHOLOGY (table 1).

Seedlings

DUKE & POLHILL (1981) reviewed our present knowledge of the seedlings of the *Leguminosæ*. BURGER HZN. (1972) described the seedlings of *Paraserianthes lophantha* and *P. falcataria*. A few additional samples have been available in the present study. In all the species studied the germination is epigeous, the fleshy, green cotyledons being early caducous. In the genera *Archidendropsis* and *Albizia* and in *Paraserianthes lophantha* the first leaf is pinnate, the second and the following ones are bipinnate with an increasing number of pinnæ and leaflets. All the leaves except the cotyledons are alternate. This type, called type 1 in the present paper, is shown in Pl. 1, 1-3.

In *Serianthes*, *Paraserianthes p.p.*, the germination is epigeal and the two first foliar leaves are opposite and bipinnate, the succeeding ones are alternate. In *Serianthes* the first leaves have opposite leaflets but after leaf no. *ca.* 10 they start getting alternate as in the mature plant. This type, called type 2 in the present paper, is shown in Pl. 1, 4.



Pl. 1. — Seedling types : 1, *Archidendropsis paivana* subsp. *tenuispica* ; note the large cotyledon in front of seedling, cotyledons placed just above the ground (MacKee 37868, AAU) ; 2, *A. macradenia* : germination truly epigeal (MacKee 38444, AAU) ; 3, *Paraserianthes lophantha* subsp. *lophantha* (Cult., AAU) ; 4, *Serianthes sachetæ*, epigeal germination, arrow pointing at scars after the cotyledons (MacKee 37649, AAU).

In *Archidendron* only few species have been studied (BURGER HZN., 1972 ; DE VOGEL, 1980). The germination is hypogeal, the leaves are twice pinnate and alternate. (*A. jiringa* and *A. ellipticum* studied).

Admittedly the data are few but the morphology of the seedlings seems to indicate a relative advanced position of *Serianthes*, *Paraserianthes* p.p. and *Archidendron* in relation to the genera *Albizia* and *Archidendropsis*, which has a 1-pinnate leaf as the first foliar leaf.

TABLE 1 : Distribution of morphological characters important at the generic level in the Pacific, Australian, Central and E. Malesian *Ingeæ*.

| GENUS and SPECIES | CHARACTER | | Seedling type | Position of leaflets | Inflorescence-type | Basic unit of inflorescence | Pod ornithochorous | Pod dehiscent | Type of seed-coat | Remarks and additional characters |
|-----------------------------|-----------|---|---------------|----------------------|--------------------|-----------------------------|--------------------|---------------|-------------------|---|
| | | | | | | | | | | |
| ARCHIDENDROPSIS | | | | | | | + | | 2 | Pods usually membranaceous and thin, seeds usually winged. Germination epigeal. |
| 1. <i>A. basaltica</i> | ? | o | s | gl. | — | | | | | |
| 2. <i>A. thozetiana</i> | ? | o | s | gl. | — | | | | | |
| 3. <i>A. xanthoxylon</i> | ? | o | c | gl. | — | | | | | |
| 4. <i>A. oblonga</i> | ? | o | s | r | — | | | | | |
| 5. <i>A. spicata</i> | ? | o | s | s | — | | | | | |
| 6. <i>A. sepikensis</i> | ? | o | c | r | — | | | | | |
| 7. <i>A. paivana</i> | 1 | o | s(c) | s, r | — | | | | | Seeds overgrown, brown. |
| 8. <i>A. fulgens</i> | ? | o | s | s | — | | | | | |
| 9. <i>A. glandulosa</i> | ? | o | s | s(r) | — | | | | | |
| 10. <i>A. granulosa</i> | ? | a | s | s | — | | | | | |
| 11. <i>A. lentiscifolia</i> | ? | o | s | s | — | | ? | | ? | |
| 12. <i>A. macradenia</i> | 1 | o | s | s | — | | | | | |
| 13. <i>A. streptocarpa</i> | 1 | o | s | s | — | | | | | |
| 14. <i>A. fournieri</i> | ? | o | c | gl. | — | | | | | |
| WALLACEODENDRON | ? | o | s | r | — | | (+) | | 1 | Pods woody, tardily dehiscent, endocarp forming envelopes. |
| PARASERIANTHES | | | | | | | + | | 1 | Pods chartaceous, dehiscent. Germination epigeal. |
| 1. <i>P. lophantha</i> | 1 | o | s | r | — | | | | | |
| 2. <i>P. pullenii</i> | ? | o | c | s | — | | ? | | ? | |
| 3. <i>P. toona</i> | ? | o | c | s | — | | | | | |
| 4. <i>P. falcataria</i> | 2 | o | c | s | — | | | | | Pod with a narrow wing. |
| PARARCHIDENDRON | ? | a | s | co. | + | + | | | 1 | |

TABLE 1 (Contd.)

| GENUS and SPECIES | CHARACTER | Seedling type | Position of leaflets | Inflorescence-type | Basic unit of inflorescence | Pod ornithochorous | Pod dehiscent | Type of seed-coat | Remarks and additional characters |
|--------------------------|-----------|---------------|----------------------|--------------------|-----------------------------|--------------------|---------------|-------------------|---|
| SERIANTHES | | | | | | — | | 1 | Germination epigeal. |
| 1. <i>S. minahassæ</i> | | ? | a | c | s | | (+) | — | |
| 2. <i>S. grandiflora</i> | | ? | a | c | r | | — | | |
| 3. <i>S. robinsonii</i> | | ? | a | c | r | | | | |
| 4. <i>S. hooglandii</i> | | ? | a | c | r | | — | | |
| 5. <i>S. kanehiræ</i> | | ? | a | c | r | | — | | |
| 6. <i>S. nelsonii</i> | | ? | a | c | gl. | | — | | |
| 7. <i>S. ebudarum</i> | | ? | a | c | gl. | | — | | |
| 8. <i>S. tenuiflora</i> | | ? | a | c | gl. | | ? | ? | |
| 9. <i>S. melanesica</i> | | ? | a | c | gl. | | — | | |
| 10. <i>S. rurutensis</i> | | ? | a | c | gl. | | — | | |
| 11. <i>S. myriadenia</i> | | ? | a | c | gl. | | — | | |
| 12. <i>S. petitiana</i> | | ? | a | c | gl. | | ? | ? | |
| 13. <i>S. calycina</i> | | 2 | a | c | gl. | | — | | |
| 14. <i>S. sachetæ</i> | | 2 | a | c | gl. | | — | | |
| 15. <i>S. lifouensis</i> | | ? | a | c | gl. | | — | | |
| 16. <i>S. germainii</i> | | ? | a | c | gl. | | — | | |
| 17. <i>S. margaretæ</i> | | 2 | a | c | gl. | | — | | |
| ARCHIDENDRON | | 2 | o(a) | c, s | all ! | + (—) | + | 2 | Germination hypogeal (3 species known). |
| ALBIZIA | | 1 | o | c | gl. cor. umb. | — | + (—) | 1 | Flowers heteromorphic. Germination epigeal. |

Seedling type : 1 = first foliar leaf once-pinnate ; 2 = first foliar leaf twice-pinnate.

Position of leaflets : alternate = a ; opposite = o.

Inflorescence-type : simple = s ; compound = c.

Basic unit of inflorescence : raceme = r ; spike = s ; corymb = co ; glomerule = gl.

Pod ornithochorous, i.e. pod reddish inside with dark, contrasting seeds.

Type of testa of the seeds : with pleurogram and « light line » = 1 ; without pleurogram and « light line » = 2.

? = character unknown.

Leaves and stipules

The stipules are visible in the seedling stage, but usually inconspicuous and early caducous in the mature plant. In a few species of *Archidendropsis* (*A. basaltica* and *A. thozetiana*) the stipules are small, hard and persisting ; in *A. fournieri* they are large and auriculate and persisting for a rather long time.

The leaflets are opposite or alternate. *Pararchidendron* and *Serianthes* are characterized by the alternate leaflets while *Albizia*, *Archidendropsis* (except *A. granulosa*), *Paraserianthes* and *Archidendron* (except *A. lucidum* and *A. muellerianum*) have opposite leaflets.

Inflorescence and flowers

Elongate inflorescence-units as racemes and spikes are the most common type in this group of genera. In the genera *Archidendropsis* and *Serianthes* abbreviation of the axis can be seen. In *Archidendropsis* the inflorescence-unit is a raceme or a spike in most of the species, but a reduction to pedunculate heads are seen in *A. fournieri* from New Caledonia and in *A. basaltica*, *A. thozetiana* and *A. xanthoxylon* from Australia. *Serianthes* subg. *Minahassæ* and sect. *Serianthes* have spikes and racemes as inflorescence-units respectively and subg. *Calycina* has pedunculate, few-flowered glomerules. The evolution in inflorescence-structure in these genera thus corresponds to that seen in *Archidendron*, where several New Guinean species as *A. aruense* has prolonged inflorescence-units (racemes) and *Archidendron* ser. *Clypearia* has species with pedunculate heads or corymbs arranged in panicles. None of the genera in this treatment has cauliflory although *Archidendropsis paivana* might have the racemes placed below the leaves at the leaf scars.

The flowers are nearly always subtended by bracts, which in the genus *Serianthes* and in *Paraserianthes falcataria* are large and concave. The flowers are uniform opposed to those of *Albizia*. They are mostly of a white or creamish colour. More vivid colours are encountered in the New Caledonian and Pacific species of *Serianthes* and *Archidendropsis paivana*, which have bright red outer part of the stamens.

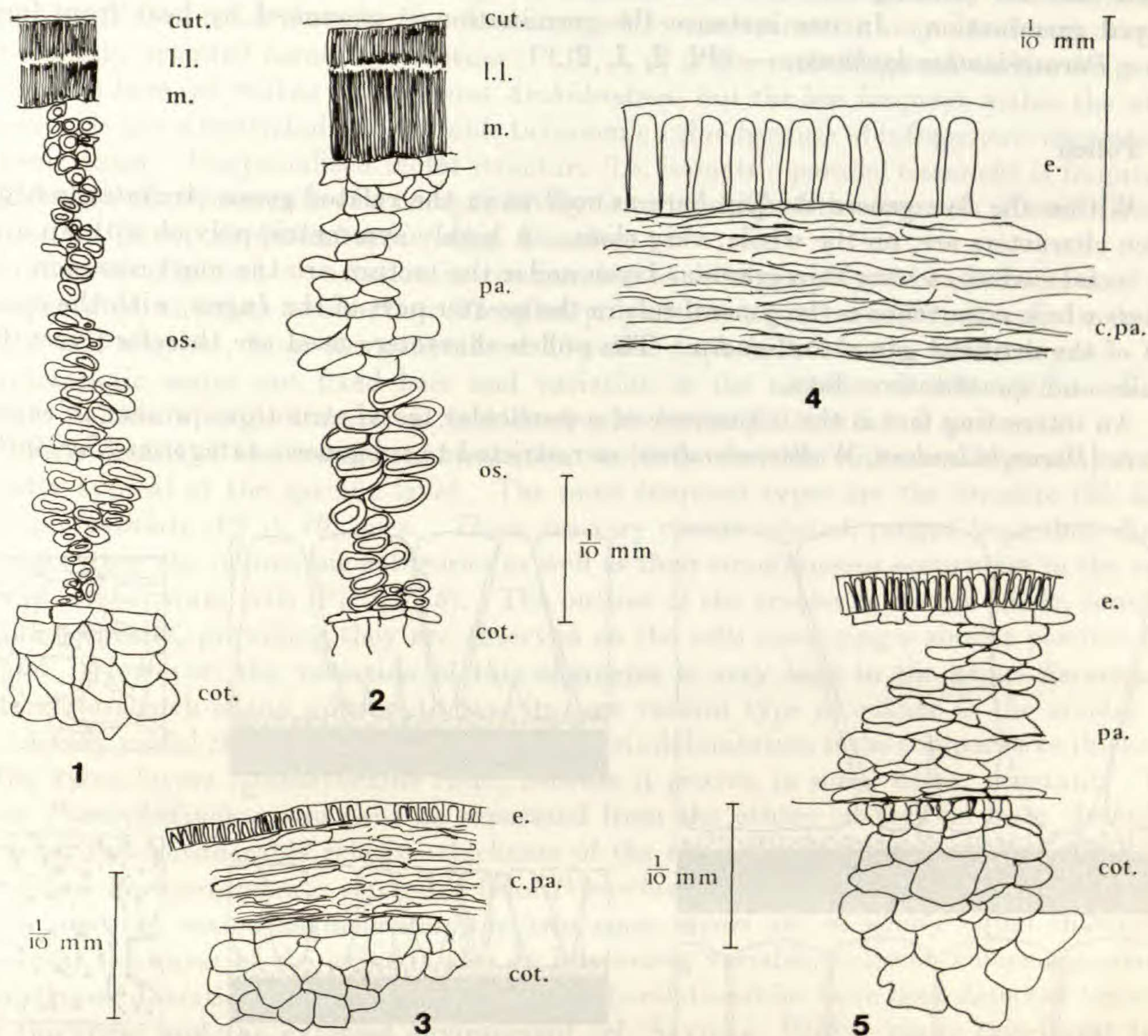
Pluricarpelly which is common in the New Guinean species of *Archidendron* has been observed in *Archidendropsis oblonga* and *Serianthes petitiana*.

Pods

The morphology of the pods is very variable. The consistence varies from thinly chartaceous (dehiscent) to woody (and indehiscent). A most peculiar pod is found in *Wallaceodendron*, where the endocarp forms a papery envelope around each seed, the envelope being the unit of dispersal. The epicarp (= exo + mesocarp) of the pods varies from chartaceous to woody, the endocarp is membranaceous to chartaceous. In *Pararchidendron* the pods remind of those of *Archidendron*. They are spirally contorted, dehiscent, yellowish outside and bright reddish-orange within.

Seeds

The seeds furnish some of the main generic characters. *Archidendropsis* usually has flattened seeds with a thin exotesta without areole. The outer layer is very thin, the protective element being an outer tier of slightly thickened palissade cells. In mature condition this layer often flakes and is membranaceous a fact that is due to the compression and degeneration of the inner layers of the integument (Pl. 2, 3, 4). This type of seed is most often winged, the endosperm is absent and it has no dormancy. It thus depends on a rapid



Pl. 2. — Transverse sections of seed-coats and outer part of cotyledons : 1, *Serianthes calycina* (MacKee 38981, AAU) ; 2, *Pararchidendron pruinosa* (s. coll. s.n., Java, BO) ; 3, *Archidendropsis macradenia* (MacKee 38444, AAU) ; 4, *Archidendropsis paivana* subsp. *tenuispica* (MacKee 37868, AAU) ; 5, *Archidendron hispidum* (NGF 28649, LAE). e. = epidermis or « palissade » layer ; c.pa. = crushed parenchyma ; cut. = cuticle ; cot. = cotyledon ; l.l. = light-line or linea lucida ; m = malpighian cells ; os. = osteosclereids.

germination. The *Archidendropsis* seed is to be regarded as a specialized *Archidendron* seed as *Archidendron* seeds have the same wall structure (cf. CORNER, 1976 : vol. II, fig. 319, and Pl. 2, 5). As the palissade cells are rather low and only slightly thickened no “light-line” (cf. GUNN, 1980 ; CAVANAGH, 1981) is observed in transsection.

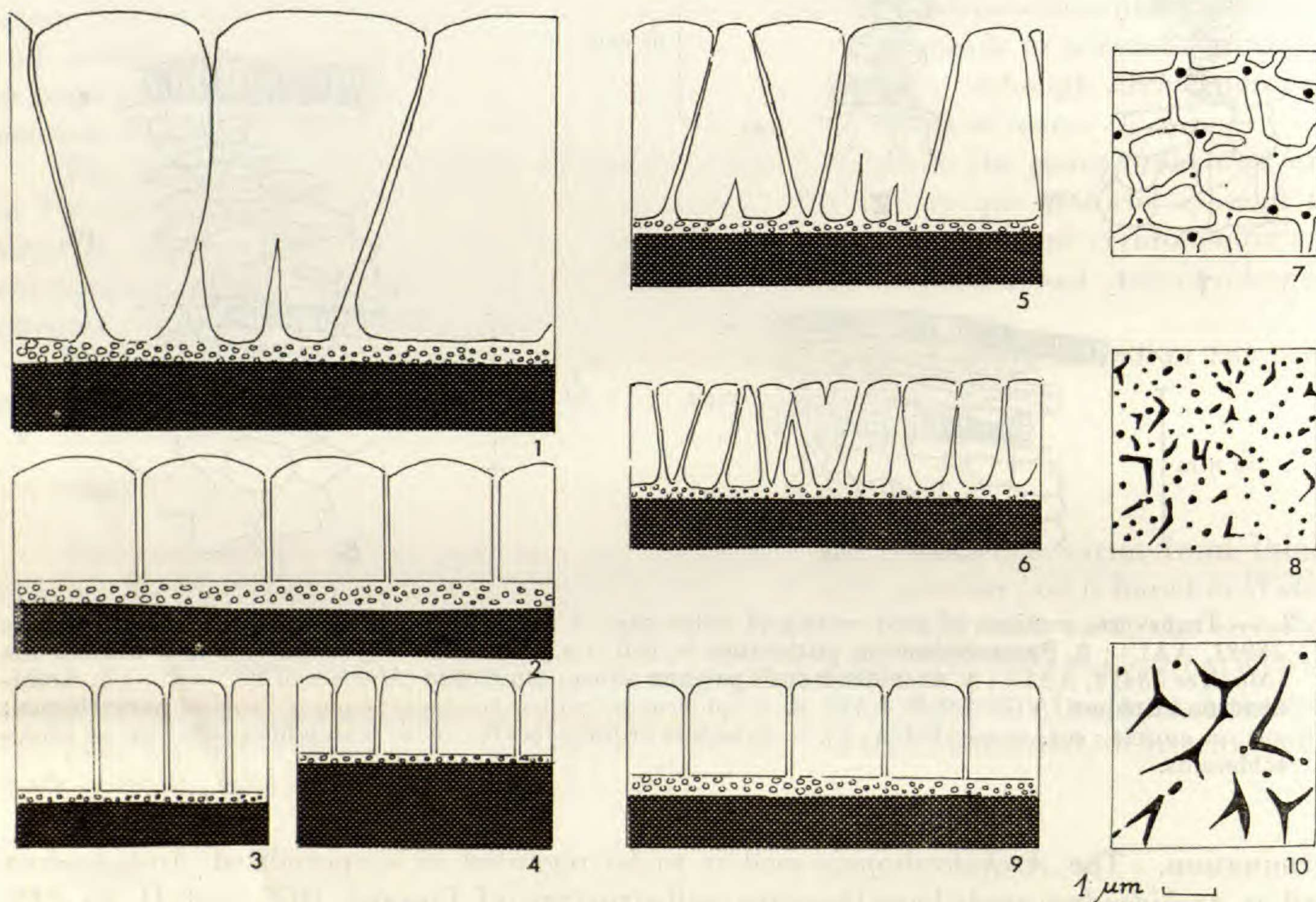
The genera *Serianthes*, *Paraserianthes*, *Wallaceodendron* and *Pararchidendron* have seeds with a thick, crustaceous exotesta with pleurogram. The epidermis of these seeds is specialized as malpighian cells, which are extremely thickwalled and furnished with a “light-line”. Moreover a larger part or all the parenchyma of the integuments has thick-

walled cells too forming the osteosclereid layer (cf. CAVANAGH, 1981). These seeds have delayed germination. In one instance the germination is provoked by heat from forest fires : *Paraserianthes lophanta*. — (Pl. 2, 1, 2).

Pollen

Within the five genera studied here as well as in the related genus *Archidendron*, the pollen characters are, on the whole, very close. A highly symmetric polyad with an areolate tectal surface, a very thin granular layer under the tectum are the most common characters whose occurrence is the general rule in the greater part of the *Ingeæ*, with the exception of the artificial genus *Calliandra*. The pollen characters used are therefore very fine details and quantitative data.

An interesting fact is the occurrence of a particular tectal structure, present in several genera (*Pararchidendron*, *Wallaceodendron*) or restricted to subgeneric categories (*Serianthes*,



Pl. 3. — Interpretation of the exine structure (from observations in LM) : 1, *Serianthes petitiana* ; exine structure on central cells ; note non-isometric channels with a non-radial orientation ; 2, *Serianthes minahassæ* ; central cells ; isometric channels, regularly radially oriented ; 3, 4, *Pararchidendron pruinatum* ; isometric parallel channels ; 3 : central cells ; 4 : peripheral cells, with a very thick nexine ; 5-8 : *Archidendron aruense* ; 5 : central cells ; 6 : peripheral cells ; 7 : ornamentation on central cells ; 8 : *id.* on peripheral cells ; 9, *Archidendropsis basaltica* ; peripheral cells ; exine structure like in *Pararchidendron*, but exine much thinner ; 10, *Paraserianthes toona* ; central cells ; fossulate ("cracked") tectal surface.

except sect. *Minahassæ*), completely absent in others (*Paraserianthes*, *Archidendropsis* subg. *Basaltica*). Such a structure, characterized by non-isometric very numerous channels not radially oriented across the tectum (Pl. 3, 1, 5) is the most frequent within the genera dealt with here (as well as in the genus *Archidendron*) but the less frequent within the whole *Ingeæ*. It has a restricted and variable taxonomic value because of infrageneric inconstancy in some cases. Unspecialized tectal structure (i.e. isometric parallel channels) is frequently linked with the occurrence of a comparatively lower density of the channels (*Paraserianthes*, *Serianthes* (few), *Archidendropsis* subg. *Basaltica*.)

In several genera a variation in the number of cells per polyad has been noticed and interpreted as either a reduction (12-celled polyads) or an increase (20, 32-celled polyads) of the cell number, from the generalized 16-celled type found in the whole *Ingeæ*. This characteristic seems not fixed here and variation in the number of cells within a single species (within a single stamen in *Archidendropsis lentiscifolia*) is not a rare event.

Fine details of the tectal ornamentation are very variable within each genus but frequently typical at the specific level. The most frequent types are the areolate (Pl. 3, 7) and the fossulate (Pl. 3, 10) ones. These are very closely related, judged from their distribution within the taxonomic categories as well as their simultaneous occurrence in the same polyad, on separate cells (Pl. 3, 7, 8). The outline of the areoles is, on the whole, constant within a species, providing they are observed on the cells occupying a similar position in a polyad. However, the variation of this character is very high in the genus *Serianthes*: here, almost each island appears to have its own variant type of outline in the areoles.

A very useful character when the aim is generic delimitation is the comparative thickness of the exine layers (sexine/nexine ratio) because it proves, in some cases, constant. The genus *Pararchidendron* can thus be separated from the others (as well as from *Archidendron*) by the considerable relative thickness of the nexine on peripheral cells (cf. Pl. 3, 4). The genus *Paraserianthes* is separable from *Pararchidendron*, which it resembles by a thick nexine, by the sexine/nexine ratio (the two main layers are of nearly equal thickness). The total thickness of the exine is also an interesting variable, extreme values apparently indicative of deviation from a common stock. No relationships have been detected between this thickness and the external environment (cf. SAVILLE, 1976): many rain-forest taxa have an exine of a considerable thickness (*Archidendron*, *Wallaceodendron*, *Serianthes*) and if a thick tectum has a protective function, it must be here against rain.

The mode of pollination is practically unknown in the genera treated here. Bees have been observed as visitors by MACKEE (notes on herbarium sheet) for *Archidendropsis fulgens* and *A. paivana* (fragrant flowers). At anthesis, the pollen is freely exposed at the bottom of each (dorsifixed) stamen, and bright brown or even red (*Serianthes* spp.), as observed on herbarium specimens.

Table 2-4 and Pl. 4. — **Pollen data, comments and legend for the generic analysis.**

Within each genus the sequence of species is based on: polyad size, structure and thickness of the tectum; these characters are subordinated to the infrageneric subdivisions as far as possible. Polyad size and thickness of the tectum are based on at least 25 measurements, the range in size of the largest diameter of the polyads is indicated by the length of the horizontal bar, the arithmetic mean is marked by a transverse bar. At the upper end of the transverse bars the mean thickness of the tectum is indicated (the figures represent practically the thickness of the sexine as the granular layer is extremely reduced everywhere). Two types of structure of the tectum are recognised.

TABLE 2

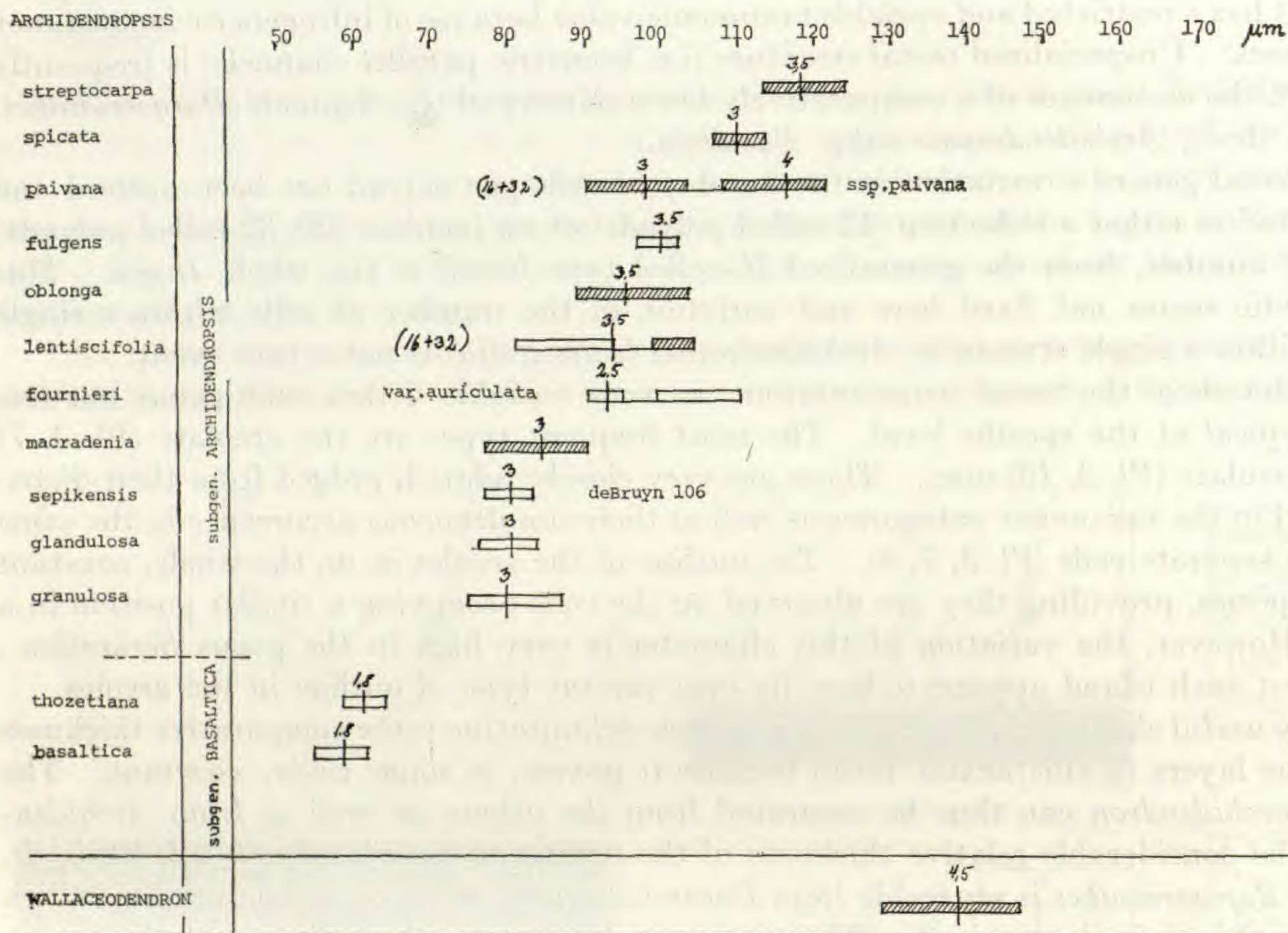


TABLE 3

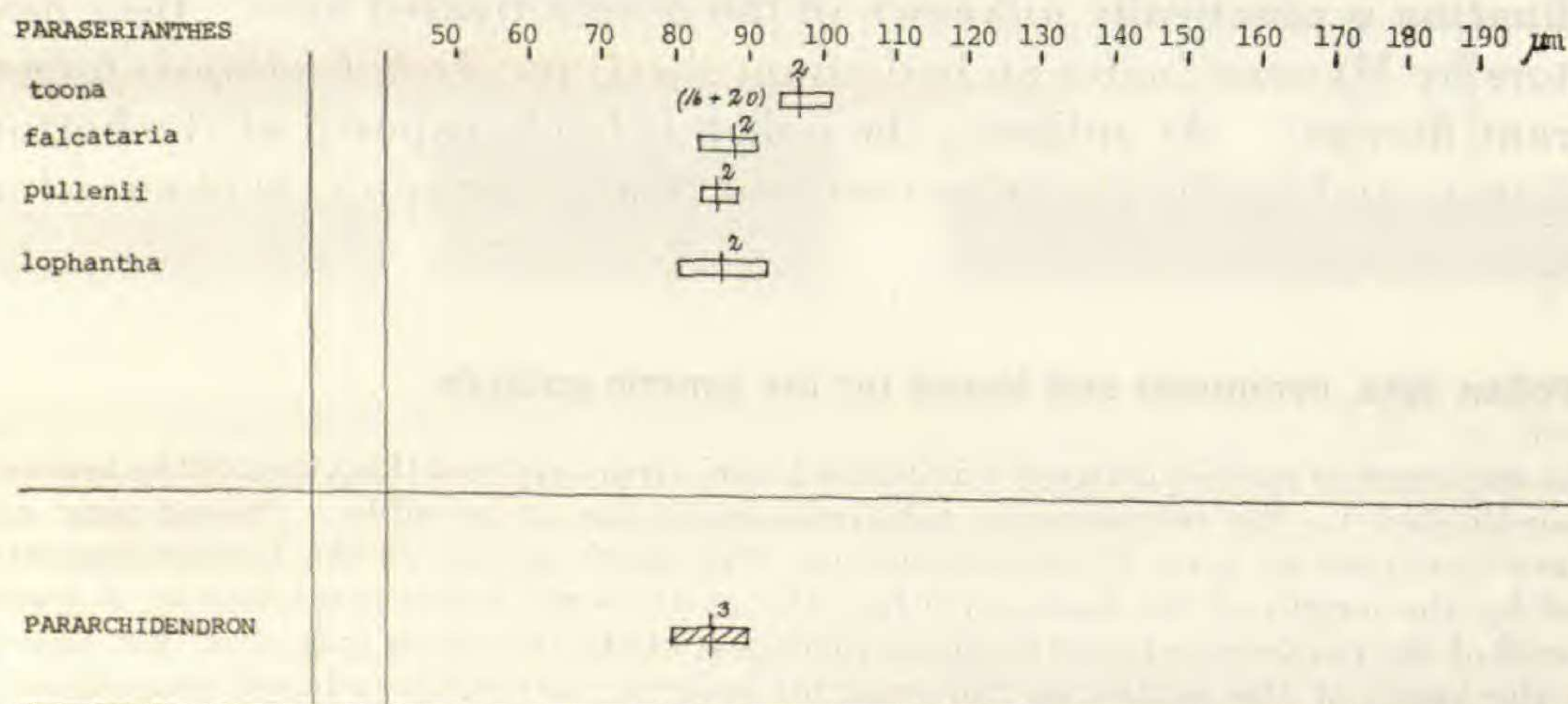
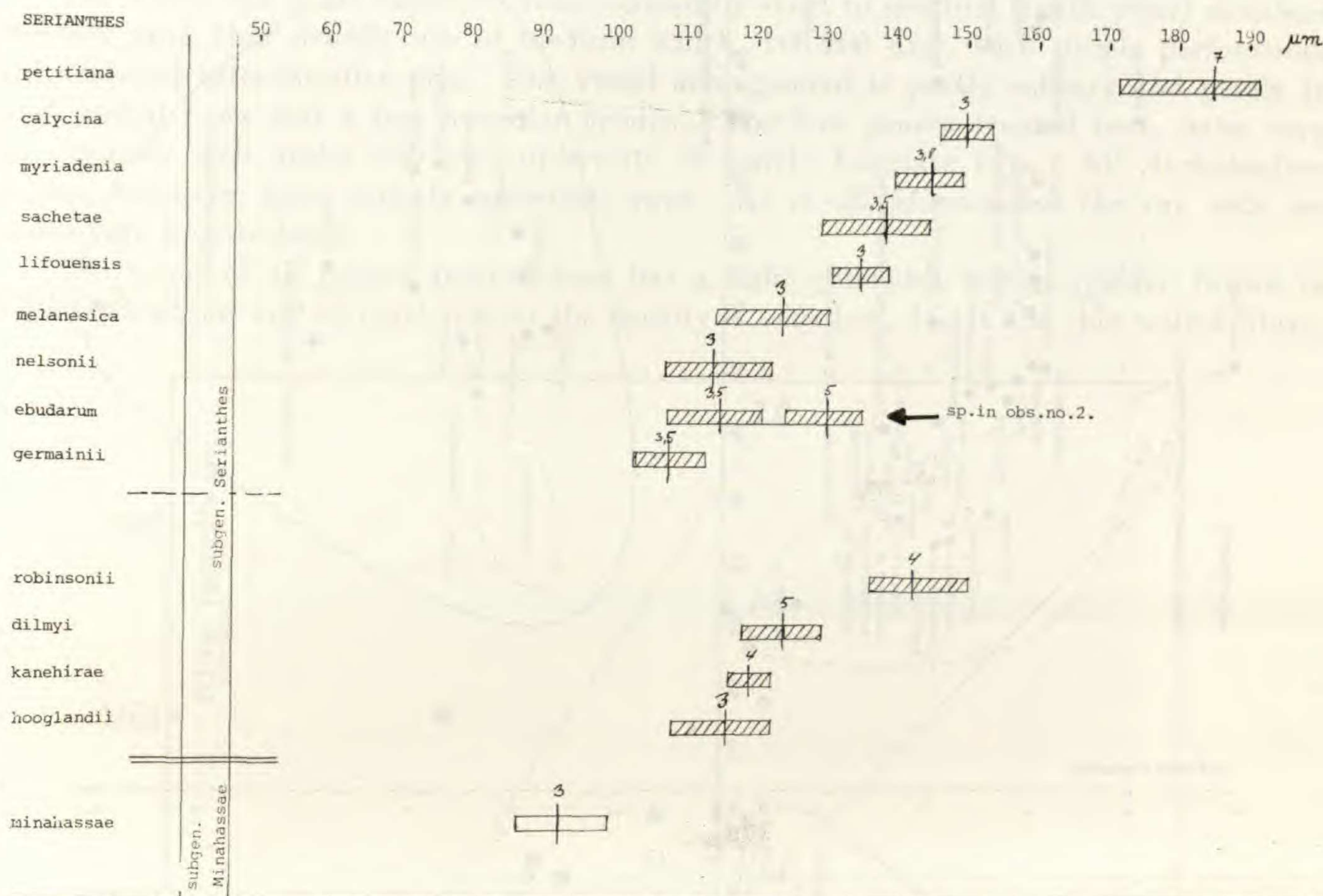


TABLE 4



Addendum : Read *grandiflora* in place of *dilmyi*.

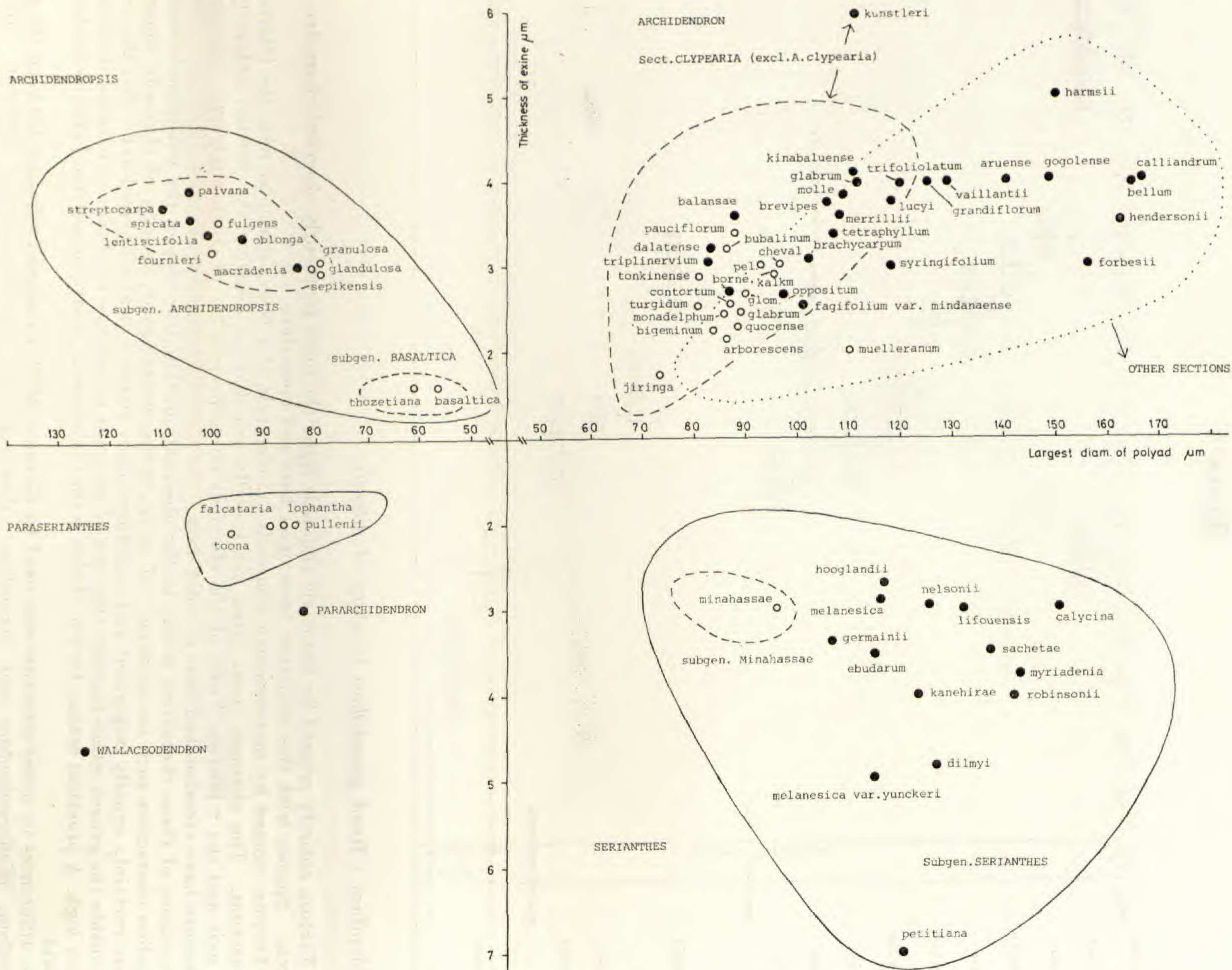
1. Tectum entirely crossed by isometric channels (pits) the most frequently observed character within the *Ingeæ*. Species with this structure have open bars and open dots.

2. Tectum crossed by non-isometric channels i.e. channels of a larger diameter near the internal side of the tectum. The channels most often not radially oriented i.e. crossing the tectum obliquely (the surface exit and the "bottom" exit of the channels not superposable at L.M.-analyses). Species with this structure have crosshatched bars or solid dots.

The choice of these characters is due to the observation, that they depict the infrageneric variation. Other pollen characters such as occurrence of costæ, sexine/nexine ratio, density of channels, heteromorphism are certainly equally important and sometimes more significant at a higher level. But they cannot be used inside the genera either because they are of constant occurrence or absent or because their variability is too high. A practical reason for the choice is that it allows a ready comparison between modern and fossil data.

The differences in tectal structure was used by GUINET (1969) to suggest affinities between the genera *Archidendron*, *Wallaceodendron* and *Serianthes*. However, they are not always clear-cut. *Archidendron clypearia*, a very variable species in other aspects too, has both structural variants.

Other important pollen-characters are noted in the generic descriptions.

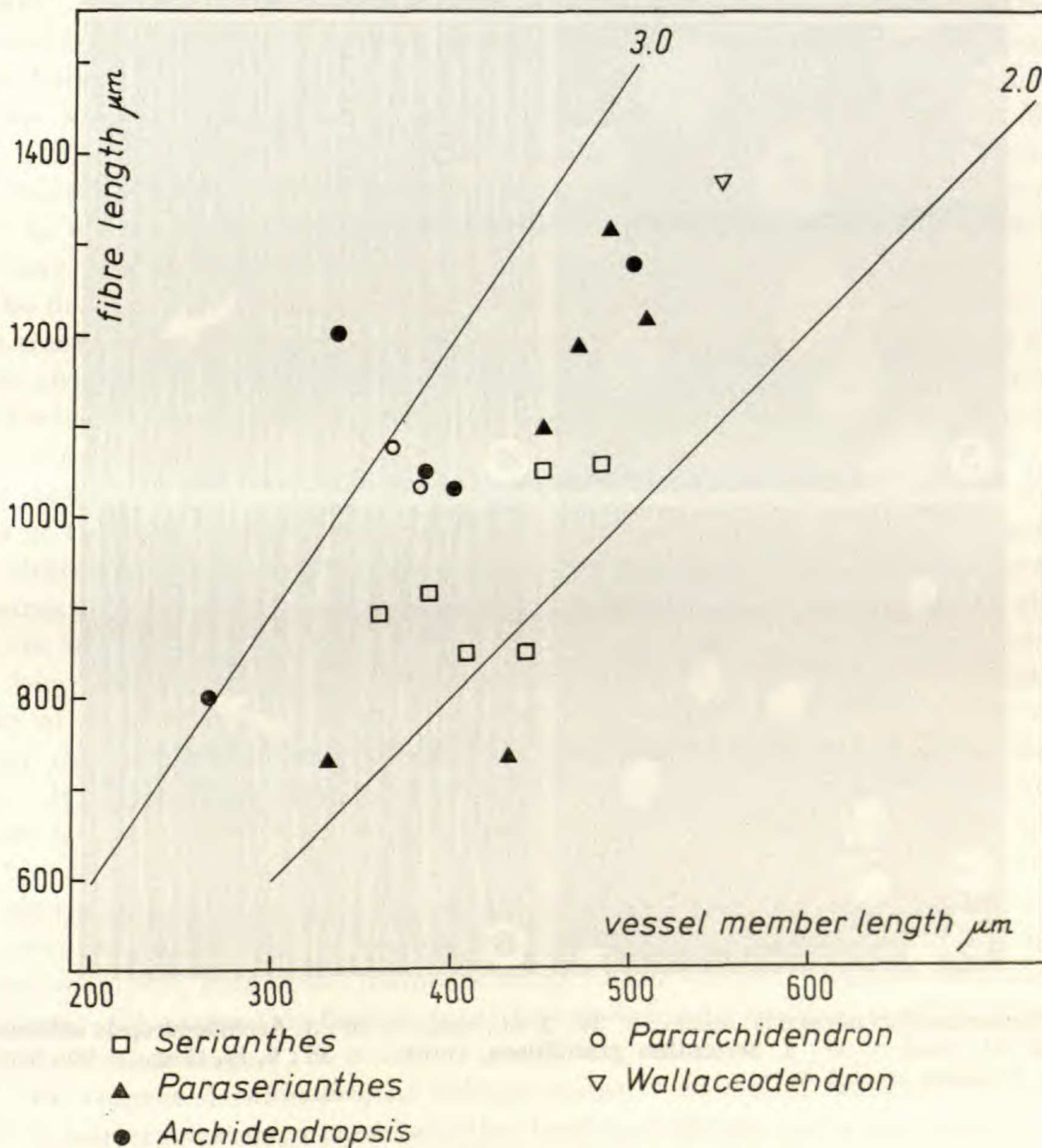


Pl. 4. — A few representatives of the genus *Archidendron* are included in order to show the array of the pollen characters. More comprehensive data will be published in the next paper on *Archidendron*.
Addendum : Read *grandiflora* in place of *dilmyi*.

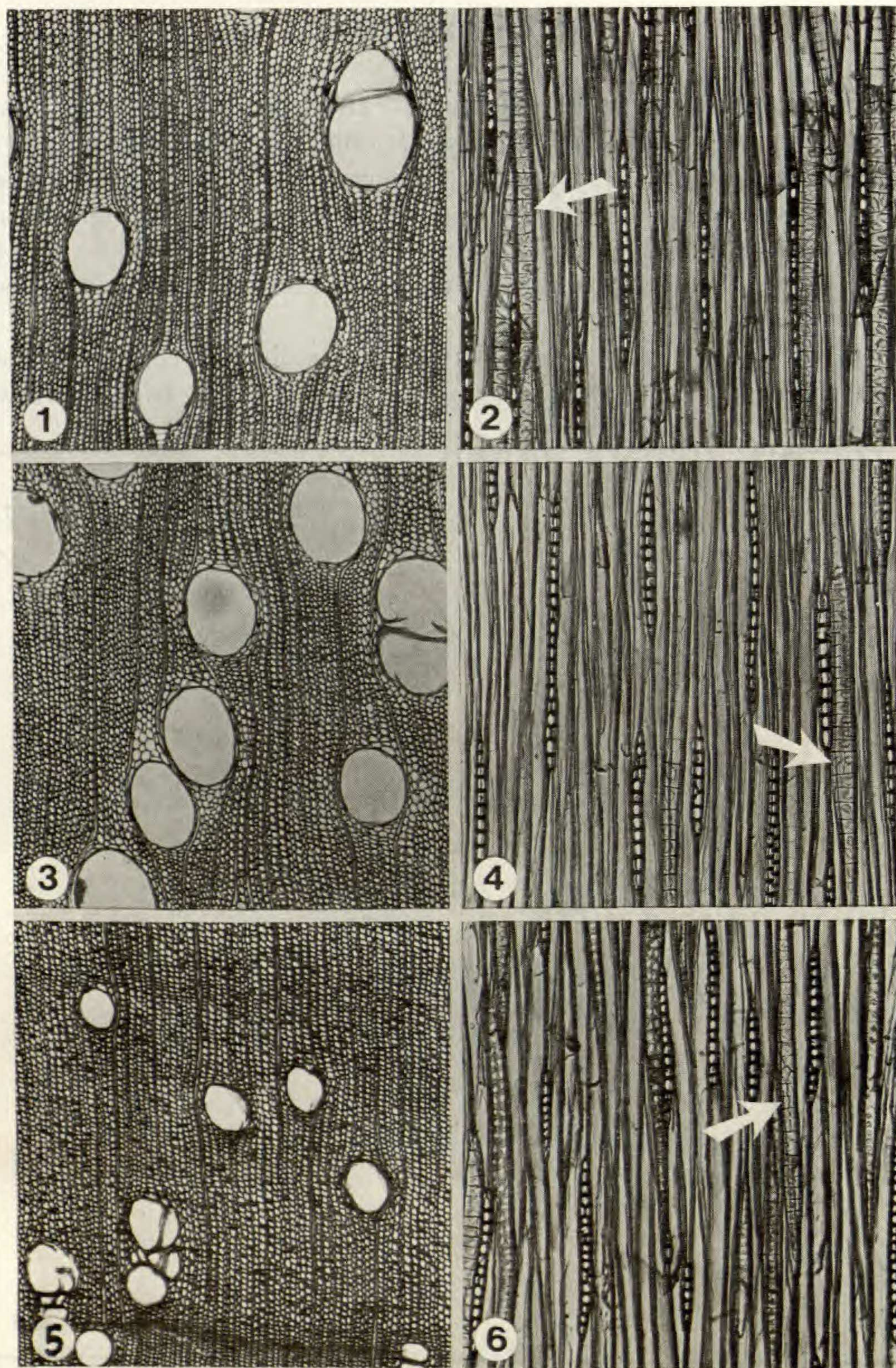
WOOD STRUCTURE

The wood, like in all *Ingeæ*, is characterised by short to medium length vessel members (250-600 μm), that usually are of medium width (100-200 μm), with simple perforations and vested intervacular pits. The vessel arrangement is partly solitary and partly in small radial rows and a few irregular groups. The five genera treated here, have very low (usually well under 400 μm) uniseriate or partly biseriate rays. All *Archidendron* species, however, have strictly uniseriate rays. As in all *Mimosoideæ* the ray cells are exclusively procumbent.

The wood of all genera treated here has a light yellowish colour, (golden brown in *Wallaceodendron*) and in most species the density is very low, due to the thin walled fibres.



Pl. 5. — Fibre/Vessel length ratio.



Pl. 6. — 1, *Paraserianthes falcata*, transv. $\times 36$; 2, *id.*, tang. $\times 90$; 3, *Archidendropsis oblonga*, transv. $\times 36$; 4, *id.*, tang. $\times 90$; 5, *Serianthes grandiflora*, transv. $\times 36$; 6, *id.* tang. $\times 90$. Arrow : note (partly) biseriate crystal fibre.

This is in particular the case in *Paraserianthes falcataria*, one of the fastest growing trees in the world and for this reason cultivated on a large scale (Tropical Legumes : Resources for the Future, 1979).

The names of the genera : *Paraserianthes*, *Archidendropsis* and *Pararchidendron*, already give an indication that they are not far removed from the original genera and from the wood anatomy as well, it is clear that this is a closely related group of species. The wood structure of *Paraserianthes* for instance, is difficult to distinguish from that of *Serianthes*, which applies in particular to *P. falcataria* : it can hardly be distinguished from that of *Serianthes minahassæ*. The anatomy of some species of *Archidendropsis* is very similar to that of *Paraserianthes* and *Serianthes* (for instance *A. oblongum*) and partly has a distinct likeness to that of *Archidendron* (*A. granulosa*). *Pararchidendron* fits very well into *Archidendron* : wood anatomically it is about intermediate between section *Clypearia* and the other sections of *Archidendron*. *Serianthes* and *Wallaceodendron* also, are very alike in wood structure. Typical for all species in all genera, except in *Pararchidendron*, is the occurrence of crystal bearing chambered fibres, containing small, somewhat flattened rhombic crystals in chambers that can be doubled, so resulting in a partly biseriate crystal fibre. I have seen this kind of crystal bearing fibre nowhere else in the *Leguminosæ*. METCALFE & CHALK (1950) mention these fibres for *Wallaceodendron* and *Serianthes myriadena* only. In my opinion, this is again an argument for a very close relationship of the treated genera. It may be of interest that in some *Archidendron* species of section *Clypearia*, a few of these fibres may be found occasionally.

The delimitation of the genera by wood structure is not easy and in most features the genera treated here have a considerable overlap, as can be seen in Pl. 6 as well as in table 5. Still, as also can be seen, the hierarchy of species within the genus or subgenus is more or less reflected in details of wood structure, as for instance in the size of intervacular pits, the ray width or the parenchyma distribution. By the abundance of parenchyma and the strictly uniseriate rays, *Archidendron* and *Pararchidendron* are very well characterised in respect of the other genera under discussion. The same holds true for the genus *Albizia*, that is characterised by septate fibres and multiseriate rays. From my previous study on the wood structure of *Leguminosæ* in general, it has become clear to me that ray structure and width are important features in the delimitation of genera (BARETTA-KUIPERS, 1981).

A very important question in this treatment is that relating the basic versus advanced position of the pertaining genera and/or species. In this respect the study of the wood anatomy can be particularly valuable, when studied in large and more or less divergent groups. It is, however, much more difficult in a small and closely related group and must therefore be handled with the utmost care. I have therefore concentrated upon a set of characters that have proven to be reliable indicators of advancement (a.o. FROST, 1930). These characters are the percentage of solitary vessels against the percentage of vessels in radial rows or groups, solitary vessels being definitely a basic character, and the length of the vessel members, long vessel members being a basic character against short ones a advanced feature. Of course this feature must be applied with caution, because the infrageneric variation is rather large.

In this respect *Archidendropsis oblonga* seems to be one of the least advanced species, with 90 % solitary vessels, a vessel member length of 500 μm and a fibre length of 1280 μm . At about the same level is *Wallaceodendron celebicum* with 85 % solitary vessels, a vessel

TABLE 5 : Wood characters

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----------------------------------|----|-----|-----|------|-------|-----|---------------------|------------------|
| <i>Paraserianthes</i> | | | | | | | | |
| <i>P. lophantha</i> subsp. loph. | 50 | 330 | 6-8 | 735 | thin | 1-2 | sc. vas. | Ser. type |
| subsp. montana | 48 | 430 | 6-8 | 740 | thin | 1-2 | sc. vas. | — |
| <i>P. pullenii</i> | 70 | 500 | 6-8 | 1220 | thin | 1-2 | al-confl. | Ser. t. |
| <i>P. toona</i> | 80 | 450 | ± 8 | 1100 | med. | 1-3 | al-confl. | Ser. t. + us. t. |
| <i>P. falcataria</i> subsp. falc. | 76 | 475 | 6-8 | 1190 | thin | 1 | sc. vas. | Ser. t. |
| subsp. fulva | 76 | 485 | ± 8 | 1110 | thin | 1 | sc. vas. | Ser. t. |
| subsp. solom. | 72 | 445 | 6-8 | 1275 | thin | 1-2 | sc. vas. | Ser. t. |
| <i>Archidendropsis</i> | | | | | | | | |
| <i>A. basaltica</i> | 60 | 265 | 4-5 | 800 | thick | 1-2 | sc. vas. | Ser. t. + us. t. |
| <i>A. thozetiana</i> | 45 | 385 | 4-5 | 1055 | thick | 1-2 | sc. vas. | us. t. + Ser. t. |
| <i>A. xanthoxylon</i> | 55 | 335 | 4-5 | 1200 | med. | 2 | al-confl. | Ser. t. |
| — — — — — | | | | | | | | |
| <i>A. oblonga</i> | 90 | 500 | 5 | 1280 | thin | 1-2 | sc. vas. | Ser. t. |
| <i>A. granulosa</i> | 68 | 400 | 5 | 1035 | thin | 1-2 | sc. vas. + marg. | Ser. t. |
| <i>Pararchidendron</i> | | | | | | | | |
| <i>P. pruinatum</i> var. pruin. | 55 | 365 | 4-5 | 1080 | med. | 1 | vas. + banded | us. t. |
| var. junghuhn. | 45 | 380 | 5-6 | 1045 | med. | 1-2 | vas. | us. t. |
| <i>Serianthes</i> | | | | | | | | |
| <i>S. minahassæ</i> | 90 | 440 | 6-8 | 850 | thin | 1 | sc. vas. | Ser. t. |
| <i>S. grandiflora</i> | 60 | 405 | 6-8 | 850 | thin | 1 | sc. vas. | Ser. t. |
| <i>S. melanesica</i> | 67 | 450 | 6-8 | 1055 | thin | 1 | vas. | Ser. t. |
| <i>S. myriadena</i> | 72 | 480 | 6-8 | 1065 | thin | 1 | alif. | Ser. t. |
| <i>S. calycina</i> | 70 | 320 | ± 8 | 940 | thin | 1-2 | al-confl. | Ser. t. |
| <i>S. sachetæ</i> | 75 | 380 | ± 8 | 920 | thin | 1-2 | al-confl. | Ser. t. |
| <i>Wallaceodendron</i> | | | | | | | | |
| <i>W. celebicum</i> | 85 | 550 | 5-6 | 1390 | med. | 1-2 | alif. | Ser. t. |
| <i>Archidendron</i> | | | | | | | | |
| sect. I t/m IV | 51 | 408 | 5-6 | 1180 | med. | 1 | banded | us. t. |
| sect. Clypearia | 68 | 437 | 6-8 | 1060 | med. | 1 | vas. | us. t. |

Explanation of the figures in the columns :

1. Percentages solitary vessels ;
2. Average vessel member length in μm ;
3. Size of intervacular pits in μm ;
4. Average length of fibres in μm ;
5. Wall thickness of fibres, thin, medium or thick ;
6. Ray width in cells ;
7. Parenchyma : scanty vasicentric, aliform-confluent, marginal or banded ;
8. Crystals : *Serianthes* type or usual type rhombic crystals.

member length of 550 μm and even longer fibres. Of the genus *Serianthes*, *S. minahassæ* stands apart with its 90 % solitary vessels, but its vessel member length of 440 μm is not exceptional in the genus. The fibre length of 850 μm is even short. In the case of *Archidendropsis basaltica* and *A. thozetiana*, the decision of basic or advanced is still more difficult, because the wood shows obvious adaptive features to the arid growth conditions (CARLQUIST, 1975), as for instance : very small and numerous vessels (average vessel diameter in *A. basaltica* 60 μm , in *A. thozetiana* 80 μm , number of vessels 25-50/ mm^2). In other *Archidendropsis* species average diameters are 150-200 μm , number of vessels 1-5/ mm^2 ; in fact these figures apply to most species in the treated genera. The rather short vessel members of *A. basaltica* may be an adaption too, but in *A. thozetiana* the vessel member has a length that is usual in this group, so, taking into account the rather low percentage of solitary vessels, the small length of vessel members as well as fibres, the subgenus *Basaltica* may be considered as more or less advanced.

Concluding, I want to cite BAILEY (1957) in saying that conclusions by the study of wood anatomy regarding relationships and classification, are only reliable when supported by the totality of evidence from other parts of the plants.

GEOGRAPHY

Most of the species treated in this paper have a very restricted distribution. Especially the genera *Archidendropsis* and *Serianthes* have many narrow endemics. *Archidendropsis* is found in New Guinea, The Bismarck Archipelago, Queensland and New Caledonia and consists of purely endemic species, no species being found in more than one of the regions mentioned above. The small distributional areas of the *Archidendropsis* species must be due to the very short viability of the seeds.

As noted in the taxonomic section *Serianthes* is an East Malesian genus, with a strong local evolution in New Caledonia. Only two species, *S. grandiflora* and *S. minahassæ* are fairly widely distributed (cf. KANIS, 1980 : 294, 295 fig. 1 & 2) whereas all the remaining species have a more or less restricted distribution, probably due to the large and heavy pods.

The monotypic genus *Wallaceodendron* is found in Northern Celebes and the Philippines. As this species is cultivated too it might have attained part of its distribution recently.

The monotypic genus *Pararchidendron* distributed in Java, The Saleier Island, Bali, Lombok, Sumba, Sumbawa, Flores, Timor, New Guinea and Australia (Queensland & N. S. Wales) is in the tropical areas only found in the montane forest. This distribution reminds a bit of the one seen in *Paraserianthes lophanta* (see also VAN STEENIS, 1979) which has a disjunct distribution between W. Australia and Java and the Lesser Sunda Islands. *Paraserianthes falcataria* is a widespread, tropical lowland to montane species naturally occurring from the Moluccas to the Solomon Islands. The remaining two species of this genus *Paraserianthes toona* (Queensland) and *P. pullenii* (New Guinea) both have a very limited area of distribution.

DISCUSSION

It is relevant to raise two major questions : How and where did the genera *Archidendropsis*, *Wallaceodendron*, *Paraserianthes*, *Pararchidendron* and *Serianthes* evolve ? Which genera/species possess the most basic characters ?

Recent data on geology and plate tectonics (AUDLEY-CHARLES, 1981 ; RAVEN & AXELROD, 1974 ; RAVEN, 1979) show that the E. Malesian area is a recent one attaining its present configuration about 10 million years ago. New Caledonia reached the present position in the Palaeocene, *ca.* 60 m.y. B.P. (RAVEN, 1979). According to RAVEN (1979) the relationships between the floras of New Guinea and New Caledonia are indirect only because Australia-New Guinea and New Caledonia moved northwards separately from the Antarctic. RAVEN therefore regards New Caledonia as a museum of the flora and the fauna that was widespread in Australia in the late Cretaceous. He further argues that the New Hebrides and other islands between New Guinea and New Caledonia are no more that 15 m.y. old and therefore not available as a pathway for ancient migration. AUDLEY-CHARLES (1981 : 27) has shown that *ca.* 40 m.y. B.P. New Guinea, Australia, The Bismarck Archipelago and the Solomon Island Ridge surrounded the New Hebrides and Fiji and that the Tonga Ridge stretched southward towards New Caledonia, thus forming a pathway between the E. Malesian area and New Caledonia already 40 m.y. B.P.

Palaeoclimatic data reviewed by RAVEN (1979 : 4-6) show that Australia was covered by a cool-temperate climate now confined to the mountains of E. Australia and Tasmania while it was placed at more southerly latitudes. But more recent and convincing data forwarded by KEMP (1981) show that the climate of the Australian continent was warmer at least in some parts and that there are evidences that support the thesis that a tropical vegetation was widespread in south-east Australia in the late Eocene (the mangrove palm *Nipa* has been found there). Throughout the Tertiary there has been climatic fluctuations. The most severe fluctuation happened in the late Miocene, when the Antarctic ice expanded. The expansion was associated with an increasing aridity of the climate (*cf.* KEMP, 1981 : 46). The result of the increasing aridity could have been an extinction of the rain forest taxa. Another possibility is that these taxa survived in the area N. of Australia or survived in refugia in Australia. RAVEN & POLHILL (1981 : 32) concluded that "there is no reason whatever to suppose that there were any legumes in Australia prior to the Miocene", because of the lack of fossil data and because of the paucity of legume genera endemic to Australia.

The distribution of the genera treated in this paper supports the views expressed by RAVEN & POLHILL (*l.c.*). There are no genera endemic to Australia or New Caledonia. Although there is a number of species endemic especially to New Caledonia these species are closely related to species found in the Archipelago N. of Australia. The distribution maps show that the genera have their main distribution in E. Malesia with only 1, non-endemic probably water-dispersed species (*Serianthes grandiflora*) reaching Mainland Asia. An implication of the geological and palaeoclimatic data mentioned above seems to be that the basic characters still preserved would have a greater chance to occur in the small taxonomically \pm isolated Australian genera or subgenera as *Paraserianthes* sect. *Paraserianthes*, *Pararchidendron* and *Archidendropsis* subg. *Basaltica*. But here we are met with difficulties

as the evolution of the different organs of a plant does not necessarily occur simultaneously. Some characters i.e. pollen-characters may have been fixed at the basic stage, while other non-correlated characters may be more derived i.e. wood-characters and inflorescence-characters or vice versa. The two species of *Archidendropsis* subg. *Basaltica*, *A. basaltica* and *A. thozetiana* possess all 6 "basic" pollen-characters. Both species have extremely thick-walled fibres very small and numerous vessels, which probably are adaptations to arid growth conditions as these are absent in the third species *A. xanthoxylon*, which grows in the rain forest; whereas *A. basaltica* and *A. thozetiana* grow in edaphic drier habitats. *A. basaltica* and *A. thozetiana* have stipules, another basic character but they have abbreviated inflorescence-units the flowers being collected in pedunculate glomerules. In the characters of pods and seeds subg. *Basaltica* is similar to subg. *Archidendropsis*. We thus have to search for the basic species of *Archidendropsis* in subg. *Archidendropsis*.

The distributions of the two species *Paraserianthes lophantha* and *Pararchidendron pruinatum* are very disjunct. Both species could as well have evolved in the area between Java - Sumatra and Australia as in Australia. They probably had a more continuous distribution during the Pleistocene, when larger areas were covered by a forest similar to the present montane forest. The isolated populations in the montane forest of Malesia have probably evolved since the Pleistocene by genetic drift. *Paraserianthes lophantha* has an isolated position in the genus because of the unbranched, elongated, racemose inflorescence, and a pinnate eophyll of the seedling. The pollen have costae and shows affinities to the pantropical genus *Albizia*. Wood-anatomically the species seems to be rather advanced having rather short vessel members and a low proportion of solitary vessels. *Pararchidendron pruinatum* probably evolved from the same basic group as *Archidendron*. Wood-anatomically it is about intermediate between sect. *Clypearia* and the other sections of *Archidendron*. Palynologically it is isolated having a specialized tectal structure and a comparatively thin nexine (1 μ m), sexine-nexine ratio 3/1. Macromorphologically it shows a mixture of characters: stipules present, alternate leaflets, flowers in axillary pedunculate corymbs, pods spirally contorted, reddish inside, seeds with pleurogram. The genus is thus well-defined.

Wallaceodendron and *Archidendropsis* subg. *Archidendropsis* are not found in Australia. Flowering specimens of *Wallaceodendron* (N. Celebes & The Philippines) and *Archidendropsis oblonga* (Solomon Islands) look very similar having solitary axillary and terminal unbranched racemes. *A. oblonga* is wood-anatomically the least specialized species studied with 90 % of the vessels solitary and a mean vessel member length of 500 μ m. *Wallaceodendron* is only slightly more advanced with 85 % solitary vessels and an even longer vessel member length, 550 μ m. Palynological data give no ideas of affinities between the two taxa but show that *Wallaceodendron* is very close to *Archidendron bellum* and allied species. *Archidendropsis* seems related to the genus *Paraserianthes* by subg. *Basaltica* and to *Serianthes* (*A. granulosa*, *A. glandulosa*, *A. cf. sepikensis*, *A. fournieri*) in the thickness of the nexine. Unfortunately only seedlings of 3 New Caledonian *Archidendropsis* species are known. These have all a pinnate eophyll a character shared with several species of the pantropical genus *Albizia*. The pods of *Wallaceodendron* are tardily dehiscent, the seeds are flattened with a rather thin testa but have pleurogram, they are being dispersed in 1-seeded envelopes formed by the endocarp. *Wallaceodendron* must have had ancestors in common with *Archidendropsis* (*A. oblonga*, *A. spicata*), which however is characterized by winged seeds

and absence of pleurogram. *Archidendropsis* now represented by narrowly endemic species and with a strong evolution in New Caledonia must be of a comparatively old age. It has probably spread to New Caledonia during the Oligocene together with the genus *Serianthes*, when the Tonga ridge could have functioned as a bridge between the New Guinea-Solomon Island area and New Caledonia or it has been spread later by long distance dispersal. In New Caledonia various specializations have taken place: the axis of the inflorescence-unit is abbreviated in *A. fournieri* to become an elongated glomerule as has happened in subg. *Basaltica*. Other specializations observable in New Caledonian species are the evolution of overgrown seeds in *A. paivana* and alternate leaflets in *A. granulosa*. Concludingly it can be stated that *Archidendropsis oblonga* and *Wallaceodendron* hold a more basic position than the New Caledonian representatives and that the two genera probably had a common ancestor.

The alternate leaflets and the woody, indehiscent pods characterize the genus *Serianthes*. Mainly because of the rather wide distributional area of *Serianthes minahassæ* which has pods not adapted to dispersal by sea currents, KANIS (1980 : 292) pointed out that this species may have had "a rather long history". He deduced that the evolution in the complex has been comparatively slow and made the hypothesis that the small flowers and many small leaflets of this species reflected a relatively primitive condition. Comparing the characters of vessel member length and percentage solitary vessels, *S. minahassæ* is less advanced with 88 % solitary vessels and a vessel member length of 440 μm , *S. grandiflora* is more specialized with 60 % solitary vessels and a vessel member length of 400 μm . *S. minahassæ* is the only species in *Serianthes* with a generalized tectal structure (isometric channels) of the pollen. Data from wood-anatomy, the alternate leaflets, the enlarged concave bracts of the inflorescence and the very tardily dehiscent or indehiscent pod make *S. minahassæ* a good *Serianthes* species, which because of the elongated inflorescence units, numerous leaflets and wood and pollen characters is to be put as a separate subgenus at the beginning of the genus.

Within this genus a reduction in the length of the inflorescence-units from a spike to a pedunculate glomerule is seen. Subg. *Serianthes* is pollen-morphologically distinct by its thicker nexine (3-7 μm). Subg. *Minahassæ* shows affinities to the genus *Paraserianthes*. The data on seedlings are not yet conclusive but indicates a relative advanced position of the genus *Serianthes*.

Serianthes (3 species known) has a bipinnate first leaf above the cotyledons, a character in common with *Paraserianthes falcataria* and *Archidendron* (3 known species). Another point is that the leaflets of the seedling-leaves are opposite both in *Serianthes* and *Paraserianthes* but get alternate in the mature plants of *Serianthes*. Data from wood-anatomy and the general habit of the inflorescences suggest close affinities between *Serianthes minahassæ* and *Paraserianthes falcataria*. Concludingly it can be stated that our data support the theory forwarded by KANIS (*l.c.*).

The reflections above can be summarized as follows: the wood characters and the macro-morphological characters are in good accordance, whereas the palynological characters seems to be more adaptive. Wood characters are adaptive too but change especially because of habitat conditions (*A. basaltica* and *A. thozetiana*) or habit conditions (lianas for instance). But as we are dealing with plants of similar habit (trees) distributed in rather uniform habitats we have stressed the importance of these characters. Characters which probably

reflect the reproduction strategy (i.e. inflorescence structure and pollen) have been used in the infrageneric groupings. The pod characters, which may be important in dispersal of the plants and consequently under strong selection pressure are used with caution as they are rather adaptable. The seed characters, which may be important in the dispersal and establishment of plants has probably been adaptable at a much earlier stage of the evolution as they have been fixed in a large pan-tropical genus as *Albizia* (see also NIELSEN, 1981a), and in *Archidendron*. Moreover they seem to be well correlated with the wood characters and vegetative characters. They are therefore given prime importance in our classification.

As we are dealing with the end products of the evolutionary processes and as we have no fossil records (except for *Polyadopollenites giganteus* from the Pliocene of Papua, which must be an *Archidendron*) we have desisted from presenting a cladistic classification. The classification presented in table 1 is based on correlated characters.

Below we have listed some putative basic and derived characters used in the classification both at the generic level and at the subgeneric level.

BASIC

Eophyll of seedling pinnate
Stipules present
Leaflets opposite
Inflorescence simple
Inflorescence-units elongated
Pod dehiscent
Seeds without pleurogram
Wood with a large proportion
of solitary vessels
Vessel elements long
16-celled polyads
Isometric tectal channels
radially oriented
Polyads small/medium
Small pore diameter
Reduced heteromorphy

DERIVED

Eophyll of seedling bipinnate
Stipules absent
Leaflets alternate
Inflorescence compound
Inflorescence-units abbreviated
Pod indehiscent
Seeds with pleurogram
Wood with a small proportion
of solitary vessels
Vessel elements short
Less (12) or more (20-48) celled polyads
Enlarged tectal channels
non radially oriented
Polyads large
Larger pore diameter
Strong heteromorphy

A systematic key to the genera of *Ingeæ* was presented in NIELSEN (1981a) together with a list of scattered morphological characters. As it is a well-known paradox that you are not able to identify fruiting specimens of *Ingeæ* to tribe and flowering specimens to genus we have presented also an artificial key to *Ingeæ* of the area below. As some of the characters used in the artificial key are specific characters they are not included in the generic descriptions. As an aid for identification use C. GUNN (in ed.), Fruits and seeds of Genera in subfamily *Mimosoideæ* (*Fabaceæ*) U.S.D.A. Technical Bulletin.

SYSTEMATIC KEY TO THE GENERA OF MALESIAN, AUSTRALIAN AND PACIFIC INGEÆ

1. Seeds with pleurogram.
2. Stipules spinescent..... *Cathormion*
- 2'. Stipules not spinescent.

- 3. Leaflets alternate.
- 4. Inflorescence consisting of glomerules, racemes or spikes collected in panicles; pods straight and woody, not ornithochorous, indehiscent or very tardily dehiscent..... 5. *Serianthes*
- 4'. Inflorescence of axillary, pedunculate corymbs; pods spirally contorted, dehiscent, reddish inside..... 4. *Pararchidendron*
- 3'. Leaflets opposite.
- 5. Flowers collected in racemes or spikes, uniform.
- 6. Endocarp forming a closed envelope around each seed..... 2. *Wallaceodendron*
- 6'. Endocarp not forming a closed envelope around each seed.. 3. *Paraserianthes*
- 5'. Flowers collected in glomerules or corymbs, most often heteromorphic.. *Albizia*
- 1'. Seeds without pleurogram.
- 7. Pods curved or spirally twisted, occasionally straight, most often reddish outside and orange-reddish inside; seeds unwinged, with a black or bluish-black crustaceous testa; if the seeds are overgrown and brownish the flowers are collected in pedunculate glomerules..... *Archidendron*
- 7'. Pods straight or curved into a flattened circle, most often brownish, neither reddish outside nor within, seeds usually winged, with a brown, membranaceous testa; if the seeds are wingless and overgrown the flowers are collected in spikes or spikelike racemes..... 1. *Archidendropsis*

ARTIFICIAL KEY TO THE GENERA OF MALESIAN, AUSTRALIAN AND PACIFIC INGEÆ

- 1. Stipules spinescent, pods jointed into 1-seeded segments..... *Cathormion*
- 1'. Stipules not spinescent, pods not jointed into 1-seeded segments.
- 2. Leaflets alternate or pinnæ unifoliolate.
- 3. Inflorescence simple.
- 4. Flowers collected in axillary corymbs, pods spirally contorted, reddish, seeds with pleurogram; leaflets stalked..... 4. *Pararchidendron*
- 4'. Flowers collected in axillary spikes, pods straight, flattened, brown, seeds without pleurogram; leaflets sessile 1. 10. *Archidendropsis granulosa*
- 3'. Inflorescence compound, consisting of pedunculate glomerules, umbels, racemes or spikes collected in racemes or panicles.
- 5. Inflorescence of glomerules collected in racemes; pods curved or spirally contorted, fleshy, reddish, seeds without pleurogram, ellipsoid, black; leaflets petiolulate..... *Archidendron* ser. *Morolobiæ*
- 5'. Inflorescence of glomerules, racemes or spikes collected in panicles; pods straight, woody, seeds with pleurogram; leaflets sessile..... 5. *Serianthes*
- 2'. Leaflets opposite, pinnæ never unifoliolate.
- 6. Flowers heteromorphic within the same part-inflorescence, seeds with pleurogram..... *Albizia*
- 6'. Flowers homomorphic within the same part-inflorescence.
- 7. Inflorescence simple.
- 8. Flowers subtended by glandular bracts i.e. bracts with a ring-shaped nectarium; pods reddish, seeds bluish-black or black.. *Archidendron* p.p.
- 8'. Flowers subtended by eglandular bracts, or bracts inconspicuous.
- 9. Inflorescence pendulous, pods reddish, seeds bluish-black or black..... *Archidendron* p.p.
- 9'. Inflorescence erect, pods brown.
- 10. Inflorescence a raceme, spike-like raceme or a spike.
- 11. Leaflets sessile.
- .. 12. Stipules present in the mature plant, seeds with pleurogram..... 3. 1. *Paraserianthes lophantha*

- 12'. Stipules absent in the mature plant..... 1. *Archidendropsis* p.p.
- 11'. Leaflets stalked.
- 13. Stamens red, ovary solitary, seeds without pleurogram.....
- 1. *Archidendropsis* p.p.
- 13'. Stamens white or cream.
- 14. Flowers pedicellate.
- 15. Ovary solitary, seeds with pleurogram, in 1-seeded envelopes
formed by the endocarp..... 2. *Wallaceodendron*
- 15'. Ovaries 3-5 per flower, seeds without pleurogram, endocarp
not forming envelopes..... 1. 4. *Archidendropsis oblonga*
- 14'. Flowers sessile..... *Archidendropsis* p.p.
- 10'. Inflorescence a pedunculate glomerule.
- 1. *Archidendropsis* subg. *Basaltica* p.p.
- 7'. Inflorescence compound.
- 16. Flowers subtended by persistent glandular bracts (i.e. bracts with a
ring-shaped nectarium)..... *Archidendron* p.p.
- 16'. Flowers not subtended by persistent glandular bracts.
- 17. Basic unit of inflorescence a raceme or a spike.
- 18. Stipules visible in the mature plant, basic unit of inflorescence a
raceme, seeds probably flattened and without pleurogram.....
- 1. 6. *Archidendropsis sepikensis*
- 18'. Stipules not visible in the mature plant.
- 19. Basic unit of inflorescence a spike, seeds with pleurogram....
- 3. *Paraserianthes* p.p.
- 19'. Basic unit of inflorescence a raceme, seeds without pleurogram
- *Archidendron* p.p.
- 17'. Basic unit of inflorescence a glomerule, corymb or an umbel.
- 20. Stipules large and auriculate persisting for a long time, pods curved,
seeds flattened..... 1. 14. *Archidendropsis fournieri*
- 20'. Stipules inconspicuous, usually early caducous.
- 21. Leaflets sessile, flowers sessile, seeds with pleurogram..... *Albizia* p.p.
- 21'. Leaflets petiolulate, if sessile then the flowers are stalked ; seeds
without pleurogram.
- 22. Pods flat, straight, oblong seeds flattened,
winged, brown..... 1. 3. *Archidendropsis xanthoxylon*
- 22'. Pods curved to spirally contorted, if straight then turgid, seeds
mostly ovoid or elliptic, black or bluish-black..... *Archidendron* p.p.

DESCRIPTIONS OF THE NEW TAXA, AND NEW COMBINATIONS

ARCHIDENDROPSIS Nielsen

Flore de la Nouvelle-Calédonie et dépendances 12 : 67 (1983).

A. *Archidendropsis* subg. *Basaltica* Nielsen, subg. nov.

A subgenere *Archidendropsides stipulis parvis, rigidis, caducis, polline polyadiis minutis, diametro 60-65 μ m, diametro pororum angusto 2,5-3 μ m differt.*

TYPE : *Archidendropsis basaltica* (F. v. Mueller) Nielsen.

Archidendropsis basaltica (F. v. Mueller) Nielsen, *comb. nov.*

— *Acacia basaltica* F. v. MUELLER, J. Proc. Linn. Soc., Bot. 3 : 146 (1859).

Archidendropsis thozetiana (F. v. Mueller) Nielsen, *comb. nov.*

— *Acacia thozetiana* F. v. MUELLER, Fragm. Phyt. Austral. 4 : 9 (1863).

Archidendropsis xanthoxylon (C. White & Francis) Nielsen, *comb. nov.*

— *Albizia xanthoxylon* C. White & Francis, Proc. Roy. Soc. Queensl. 41 : 141, tab. X (1929).

B. Archidendropsis subg. Archidendropsis

Archidendropsis oblonga (Hemsley) Nielsen, *comb. nov.*

— *Hansemannia oblonga* HEMSLEY, Kew Bull. 1892 : 125.

Archidendropsis spicata (Verdc.) Nielsen, *comb. nov.*

— *Archidendron spicatum* VERDC., Kew Bull. 32 : 229 (1977).

Archidendropsis sepikensis (Verdc.) Nielsen, *comb. nov.*

— *Albizia sepikensis* VERDC., Kew Bull. 32 : 473 (1978).

PARASERIANTHES Nielsen, *gen. nov.*

Genus novum Leguminosarum - Mimosoidearum - tribus Ingearum, generi Serianthidi Benth. affine.

Arbores vel frutices inarmati ; stipuli non spinescentes ; folia bipinnata foliolis oppositis ; flores in racemas axillares congregati aut in spicas, paniculas formantes vel solitarias ; flores inflorescentiæ partialis uniuscujusque uniformes, ovario solitario (raro duobus) ; legumina cartaginea, plana, recta, non segmentata neque intus rubentia, endocarpio involucrium circa utrumque semen non formante ; semina subcirculatim elliptica versus oblonga, convexa sed parum compressa, cum pleurogrammatibus, sine arillis, sclerotestis crassis inalatis.

TYPE-SPECIES : *Paraserianthes lophantha* (Willd.) Nielsen.

A. Paraserianthes sect. Paraserianthes

Paraserianthes lophantha (Willd.) Nielsen, *comb. nov.*

— *Acacia lophantha* Willd., Sp. Pl. 4 : 1070 (1806).

subsp. **montana** (Junghuhn) Nielsen, *stat. & comb. nov.*

var. **montana**

— *Acacia montana* JUNGHUHN, Nat. Tijdschr. Ned. Ind. 5 : 626 (1842).

var. **kostermansii** (Fosberg) Nielsen, *comb. nov.*

— *Albizia montana* (JUNGHUHN) BENTH. var. *kostermansii* FOSBERG, Reinwartia 7 : 79 (1965).

B. Paraserianthes sect. **Falcataria** Nielsen, *sect. nov.*

Flores in spicatis paniculatis ; polline sine costis.

TYPE-SPECIES : *Paraserianthes falcataria* (L.) Nielsen.

Paraserianthes pullenii (Verdc.) Nielsen, *comb. nov.*

— *Albizia pullenii* VERDC., Kew Bull. 33 (3) : 408 (1979).

Paraserianthes toona (Bailey) Nielsen, *comb. nov.*

— *Albizia toona* BAILEY, Syn. Queensl. Fl. 1, Suppl. : 18 (1886).

Paraserianthes falcataria (L.) Nielsen, *comb. nov.*

— *Adenanthera falcataria* L., Sp. Pl., ed. 2 : 550 (1762).

P. falcataria subsp. **solomonensis** Nielsen, *subsp. nov.*

A subsp. falcataria nervo principali folioli quarta vel tertia parte latitudinis folioli a margine apicali remoto, rachide folii sæpe densissime tomentosa differt.

TYPE : Brass 3223, Solomon Islands, Ysabel Island, Tiratona, alt. 600 m, 26.11.1932, fl. (holo-, A ; iso, BO, L).

P. falcataria subsp. **fulva** (Lane-Poole) Nielsen, *comb. nov.*

— *Albizia fulva* LANE-POOLE, Rep. For. Res. Papua N. Guinea : 91 (1925).

PARARCHIDENDRON Nielsen, *gen. nov.*

— « Gen. C » NIELSEN in Advances in Leg. Syst. : 186 (1981).

Genus novum Leguminosarum - Mimosoidearum - tribus Ingearum ex affinitate generis Archidendri F.v. Muell. Arbores vel frutices inarmati ; stipuli non spinescentes ; folia bipinnata, foliolis

alternis ; flores in corymbos axillares, pedunculatos, collati ; flores inflorescentiæ partialis uniuscujusque uniformes, ovarium unum ; legumina in circulum curvata aut contorta, cartaginea, plana, dehiscentia, intus rubentia, endocarpio involucrium circa utrumque semen non formante ; semina ellipsoidea, obovoidea vel subglobosa, inalata, cum pleurogrammate, sine arillo, sclerotesta crassa et nigra.

TYPE-SPECIES : *Pararchidendron pruinsum* (Benth.) Nielsen.

Pararchidendron pruinsum (Benth.) Nielsen, *comb. nov.*

— *Pithecellobium pruinsum* BENTH., London J. Bot. 3 : 211 (1844).

P. pruinsum var. **junghuhnianum** (Benth.) Nielsen, *comb. & stat. nov.*

— *Pithecellobium junghuhnianum* BENTH. in MIQ., Pl. Jungh. 1 : 269 (1852).

P. pruinsum var. **sumbawaense** (Kosterm.) Nielsen, *comb. & stat. nov.*

— *Abarema sumbawaensis* KOSTERM., Reinwartia 6 : 160, fig. 45 (1962).

P. pruinsum var. **novo-guineense** Nielsen, *var. nov.*

A var. pruinoso foliolis acutis differt.

TYPE : *Mary S. Clemens 11334*, New Guinea, Matap, Morobe distr., alt. 1650-2000 m (holo-, A)

SERIANTHES Benth

London J. Bot. 3 : 225 (1844).

Serianthes subg. **Minahassæ** Nielsen, *subg. nov.*

Inflorescentia panicula spicarum pedunculatarum. Stamina alba vel eburnea. Legumen epicarpio tenuiter lignoso, endocarpio pergamaceo, intus quasi non segmentatum. Legumina tarde dehiscentia vel indehiscentia.

TYPE : *Serianthes minahassæ* (Koorders) Merrill & Perry.

Serianthes subg. **Serianthes**

sect. **Calycina** Nielsen, *sect. nov.*

Inflorescentia glomeruli vel umbellæ composita. Stamina purpurea distaliter. Legumen epicarpio coriaceo, rigider chartaceo vel lignoso, endocarpio \pm parchemineo ; semina in loculis valde distantibus habitantia.

TYPE : *Serianthes calycina* Benth.

Serianthes rurutensis (F. Brown) Nielsen, *comb. & stat. nov.*

— *Serianthes myriadenia* var. *rurutensis* F. BROWN, Bull. Bish. Mus. 130 : 105 (1935).

(To be continued)